

An Adaptive Approach for Dynamic Resource Allocation in Cloud Service

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Abstract : Today Cloud Services are offered on demand by the Cloud providers through pay-as-you-go model through internet. Services can be in three layers Cloud Computing offer different type of services according to different kinds of customer requirements. The key feature of Cloud is that it is Decreased Cost, Large Storage, Flexibility, Reliability, elasticity, resource pooling and measured service, and contract anytime. Currently there are few challenges in cloud computing are security, fault tolerance and resource allocation. Auction-based allocations are efficient in assigning heterogeneous VMs to cloud users who value them the most. Existing cloud auction mechanism often overlooks trade of resources but does not meet the providing the dynamic resources to the cloud users. The job type based online auction is proposed to reduce the number of rounds in the auction as well as improving the social welfare with same level of competitive ratio and truthfulness.

Keywords : Cloud Computing, (IaaS) Infrastructure as a service, (SaaS) Software as a Service and PaaS (Platform as a Service).

1. INTRODUCTION

Cloud Computing is a service model which was actually introduced to render computational resources over the internet and it has been accepted and used by the industry. But still there are many open challenges like Virtual Machine Migration, Energy Management, Fault Tolerance and Scalability, Interoperability, Data Security, Resource Allocation which need to address so as to be fully adopted by the industry and to make this model more secure, efficient, and cost effective for user's requirements. Cloud providers have finite set of resources but in user's view there are infinite resources. These resources should be properly allocated among users in order to earn more revenue. So, Resource Allocation is one of the most challenging issues in Cloud. Most of the existing Resource allocation techniques are static that try to allocate resources accordingly. But the demand of resources is dynamic in nature in which users enter or leave anytime they wish these dynamic scenarios cannot be handled by static approach. Resources should be allocated according to demand and supply model. The prices of resources are also fixed or pay-as-you model is followed. But for proper generation of revenue in dynamic environment of demand and supply, dynamic model for pricing should be considered. These challenges need to be considered in detailed for proper adoption of Cloud by complete industry.

2. RELATED WORK

Cloud Computing is a service model which was actually introduced to render computational resources over the internet and it has been accepted and used by the industry. According to [1] cloud resource allocation must restrict the degradation of performance up to certain range. Allocation techniques should be aware of status of every resource in distributed environment. And using this information efficiently applies algorithms so as to allocate computing resources in distributed environment. The key element in resource management is discovery process. It consists of

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locating the appropriate resources that are requested by users and required by applications [2]. Resource Allocation (RA) in Cloud environment is the process of allocating computing resources to the Cloud users on demand over the internet. If resources are not managed and allocated properly, there occurs the problem of resource starvation. It generally happens due to over provision and under provisioning of Cloud resources among users. It needs some prior information like amount of resources, type of resources and time for which resources are requested for efficiently allocating resources [3]. In [4] for parallel data processing, a dynamic resource allocation technique known as Nephele has been proposed which a framework is specially designed for Cloud. It is first processing framework which helps in dynamic allocating and de-allocating of computing resources. Virtual Machines are assigned the task of processing job and these are instantiated and dismissed automatically while execution of job.

3. EXISTING SYSTEM

In online auction framework, the dynamic resource provisioning is achieved with good social welfare, competitive ratio and truthfulness. But the number of rounds in the framework is more which will take more time to complete the auction. Because of the randomized auction and primal dual algorithm is applied to the each bundle of the user for every round it will consume more time to complete the auction

Limitations

- Computationally not feasible for heterogeneous VM provisioning
- There are More chances for shill bidding in the auction
- Over - estimation & under - estimation for Dynamic Resource
- Untruthful bidding

4. PROPOSED SYSTEM

In proposed technique, Resource Type Based Auction is proposed, here there are different type resources such as RAM, storage and CPU assembled from the various datacenter from various regions. The cloud user demands are heterogeneous in nature to provide the various virtual machine types and various resources. Before start the auction, the cloud users are categorized based on the type of job for the demand, then auction will be conducted separately for each type of user. Hence the number of rounds in the auction will be reduced as well as social welfare will be maximized, and it promotes the objective successfully

- To employ an adaptive Approach for Dynamic Resource Allocation to maximize the social welfare.
- To provide the economic efficiency in cloud online auction under truthful bidding
- To maximize the revenue and utilization in cloud service provider
- Over - estimation & under - estimation for Dynamic Resource Allocation will be eliminated through the centralized adaptive Market Approach.

5. IMPLEMENTATION

In our proposed system we eliminate the untruthful bidding, Shill bidding auction, over - estimation & under - estimation for Dynamic Resource, heterogeneous VM issue. Primal-dual algorithm is used to do one-round optimized resource allocation, then it will translate the one-round optimized resource allocation to the approximation value to provide truthful auction. Also the problem of resource allocation is solved using Resource Type Based Auction technique and by using dynamic pricing model for pricing of resources. Buyer asks resources and seller usually bid for providing services to users. The auction winner provides services to users. The users will submit their requirements to the auctioneer. There are different types of resources available with Cloud resource providers. User can demand any amount of resources of each particular type of resource in the form of bundle. After receiving request, auctioneer will send messages to Cloud providers who will then start.

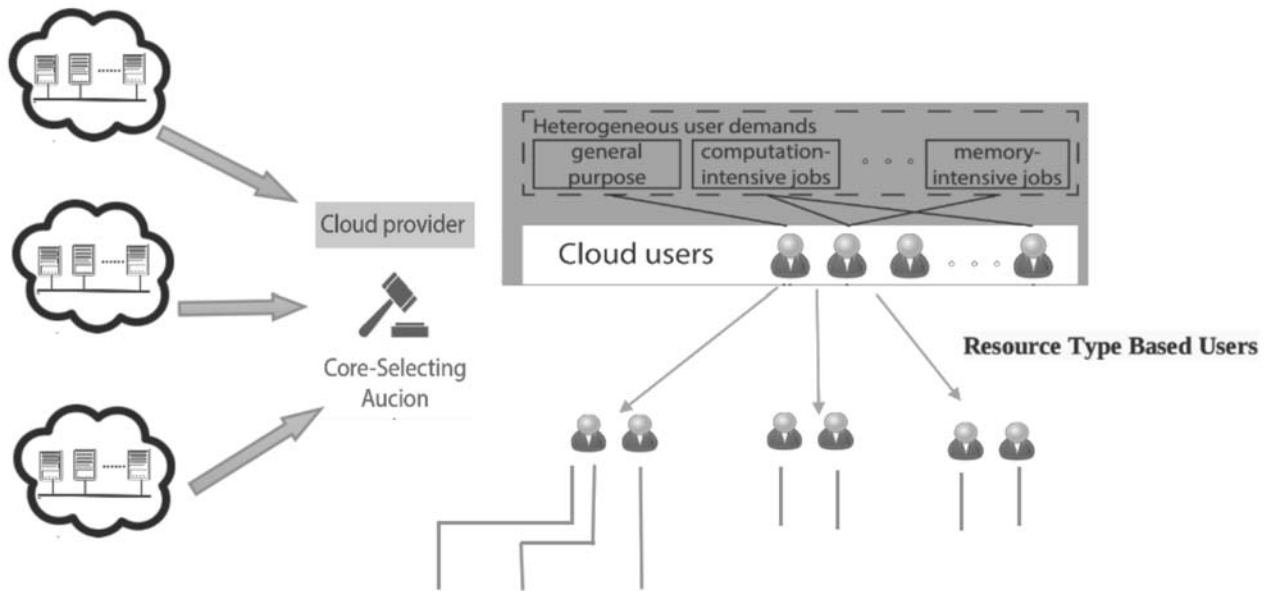


Fig 1. Architecture Diagram

Implementation of the proposed paper includes the following modules :

- Datacenter Configuration Setup
- Creating the Cloud users, bundles and type of job
- Categorizing the cloud user based on the type of job
- Conduct Auction
- Providing the Resource and updating the datacenter

Datacenter Configuration Setup

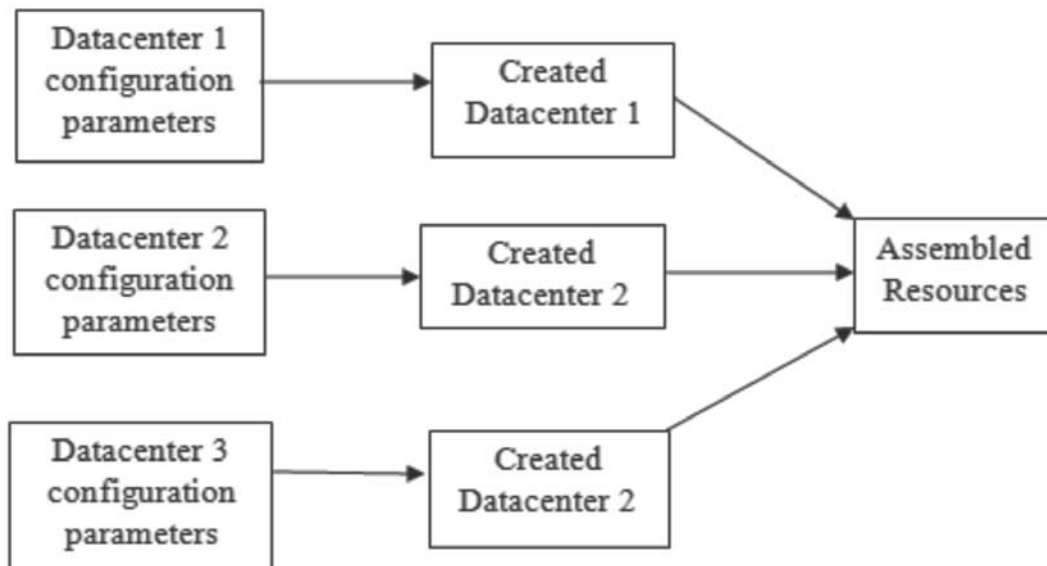


Fig. 2. Datacenter Configuration Setup Diagram

For creating the cloud datacenter (cloud service provider), the input parameters such as mips, virtual machine counts in the datacenter, virtual machine characteristics, processing elements in the datacenter, ram, storage size and datacenter name are given to the cloudsim after the initialization. The datacenters are created and resources from the various datacenter from the various regions are assembled to the Auctioneer who conducts the auction

Creating the Cloud users, bundles and type of job

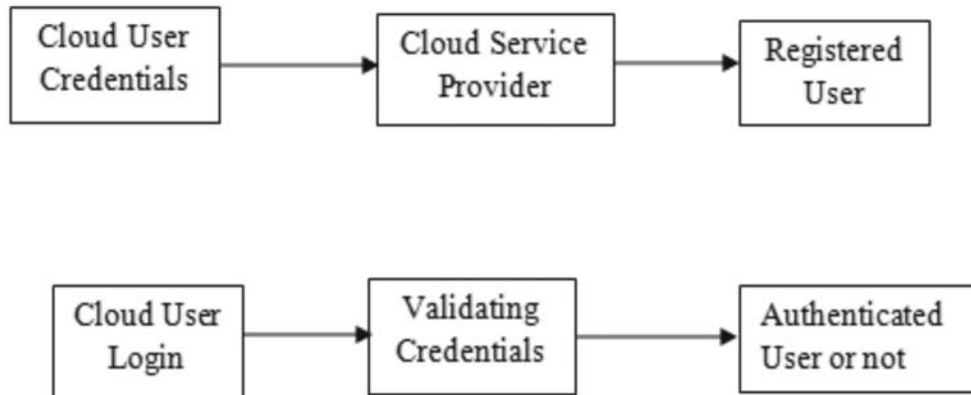


Fig. 3. Creating the Cloud users, bundles and type of job diagram

Before participate in auction, the cloud user must be registered with the cloud service provider by submitting their details such as user name, password and other required credentials.

Categorizing the cloud user based on the type of job

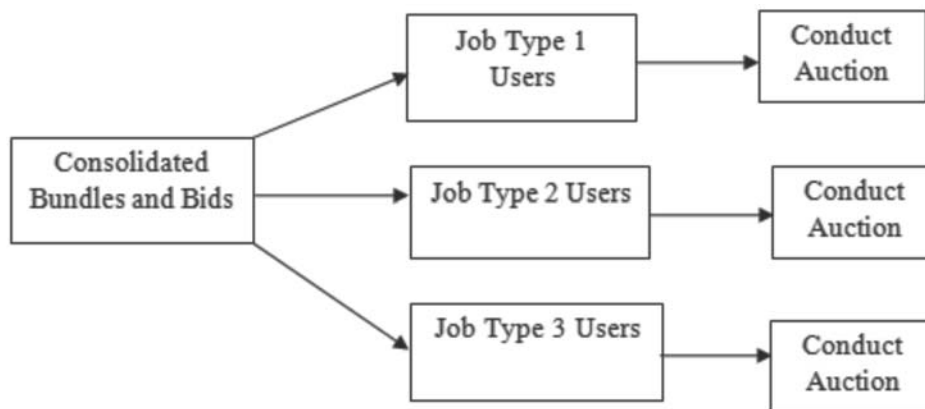


Fig. 4. Categorizing the cloud user based on the type of job diagram

The cloud users are categorized based on the type or purpose of resource demand. If totally three type of resource in the user demands then there will be three types of users. These users will be participated in the auction separately and the winner will be chosen depends on the bid valuation and available budget of the each user.

Conduct Auction

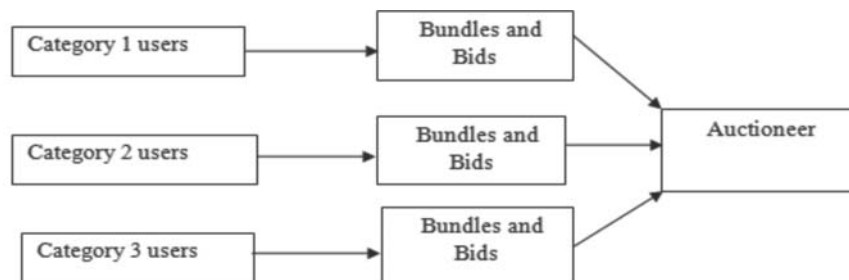


Fig. 5. Conduct Auction diagram

The Each category of the cloud users are participate the auction separately based on their purpose of job such memory intensive jobs, general purpose job and computation intensive jobs. The combinatorial auctions with multiple rounds are conducted among the cloud users. The user will be selected as the winner not only based on their bid but also on the remaining budget they have in each round.

Providing the Resource and updating the datacenter resource

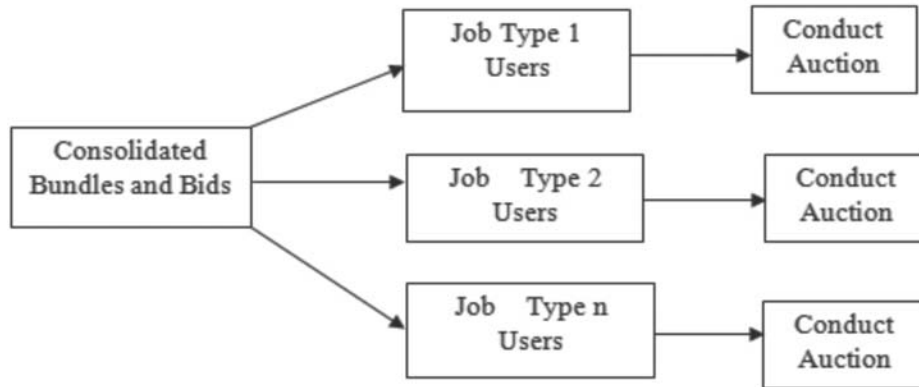


Fig. 6. Providing the Resource and updating the datacenter resource Diagram

The cloud users are categorized based on the type of resource maximum they have put on the bundles. If totally three type of resource in the user demands then there will be three types of users. These users will be participated in the auction separately and the winner will be chosen depends on the bid valuation and available budget of the each user.

Providing the Resource

The auction winner in the each round and in each type of user is selected by the auctioneer who conducts the auction based on the cloud user bids and available budget. Finally the heterogeneous virtual machines are provided to the auction winner.

6. EXPERIMENTAL STUDY, RESULT AND DISCUSSION

The proposed Resource Type based dynamic has been implemented in CloudSim toolkit by extending the framework of toolkit. Different Cloud providers (Different Data centers) and their resources and configuration details is depicted in below Figure. Different types of VM are created as to provide resources to users. Bundle of resources can be provided to user by initiating different type of VMs. The attributes are set according to CloudSim capability. Range of different parameters is set in CloudSim. Four parameters are considers i.e. processor speed, memory size, storage and bandwidth. The range of memory is [256, 512, 1024] MB, storage [2000, 10000] MB, bandwidth [120, 1000] b/s and processor range is [220, 1000].

Scenario : 1

A scenario was created for testing of Resource Type based dynamic auction. In the scenario 50 users asked for resources from the auctioneer and 20 Cloud providers attended the auction means they bid for the current auction process. Figure 6.1 depicts the scenario for participants of auction process.

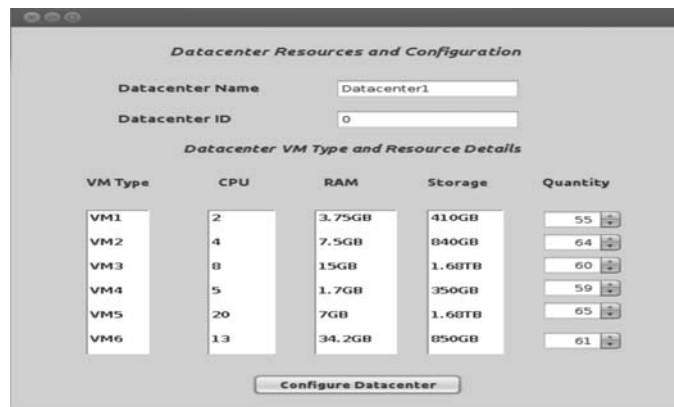


Fig. 7. Auction Process – Procurement Auction Process Panel

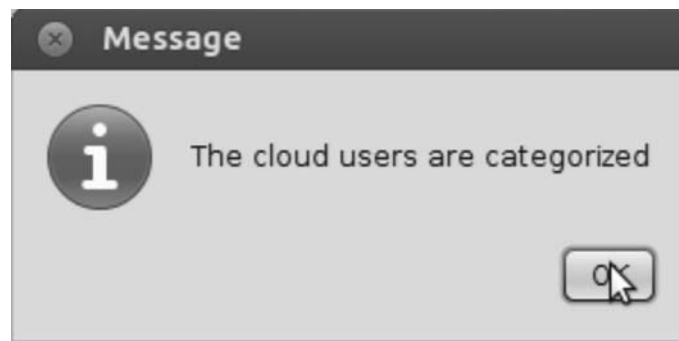


Fig. 8. Message displays the Cloud Users are categorized

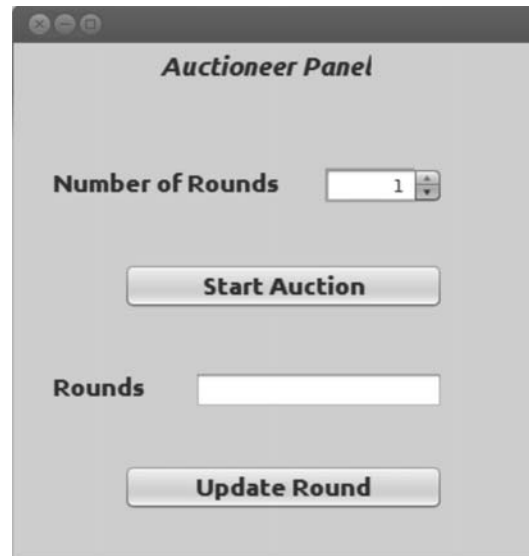


Fig. 9. Auctioneer Panel Displays the Round one Auction

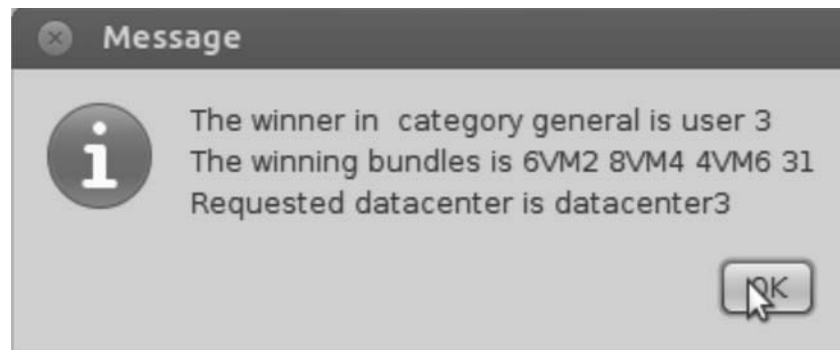


Fig. 10. Message displays the Bid Winning User Category

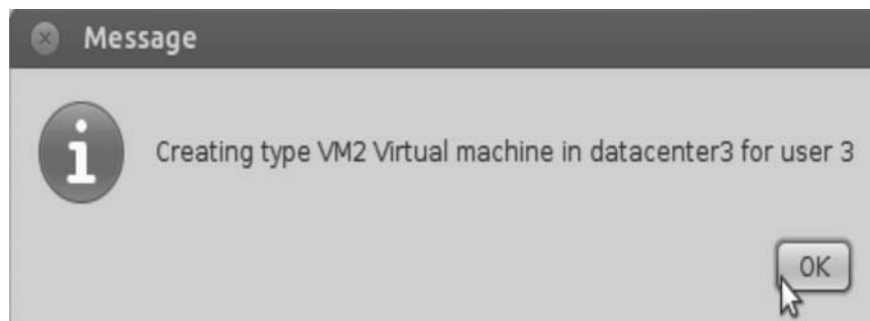


Fig. 11. Message displays the VM Created for the Bid Winning User

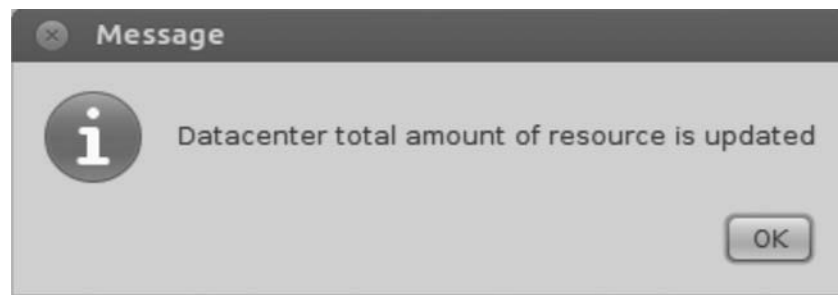


Fig. 12. Message Displays the Updated value of Datacenter's Total amount of resource

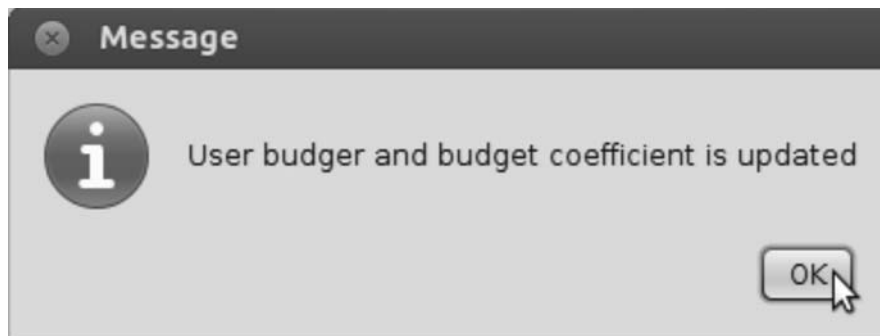


Fig 13. Message Displays the User Budget and budget Co-efficient update

7. DISCUSSION AND CONCLUSION

The Resource Type Based Online Auction Framework for Dynamic Resource Provisioning in Cloud Computing is proposed in which the cloud users are splitted into many groups based on the maximum resource they have demanded. The primal dual algorithm is applied to the each round and all type of user in the cloud auction and it was clearly shown that the proposed scheme achieved the number of rounds in the cloud auction is reduced with good social welfare, truthful in bidding and competitive ratio. This move will ensure that the cloud user will get the true bidding value for any number of bundles in Cloud Auction.

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